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Terms	Documents
L1 and bridge	11

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L2	L1 and bridge	11	L2
L1	dock$3 same bus same switch$3 same cycle	23	L1

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DB=PGPB,USPT,USOC; PLUR=YES; OP=OR			
L2	L1 and bridge	11	L2
L1	dock$3 same bus same switch$3 same cycle	23	L1

END OF SEARCH HISTORY

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Search Results -

Terms	Documents
(361/683 |361/686 |709/250 |709/253 |710/301 |710/62 |710/104 |710/316 |710/304 |710/302 |710/300 |710/303 |710/305).ccls.	8553

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DB=PGPB,USPT,USOC; PLUR=YES; OP=OR			
L2	L1 and bridge	11	L2
L1	dock$3 same bus same switch$3 same cycle	23	L1

END OF SEARCH HISTORY

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Refine Search

Search Results -

Terms	Documents
L1 and L4	8

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Search: L5

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L4	710/301,62,104,316,304,302,300,303,305;361/683,686;709/250,253.ccls.	8553	L4
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L3	L2	0	L3
DB=PGPB,USPT,USOC; PLUR=YES; OP=OR			
L2	L1 and bridge	11	L2
L1	dock$3 same bus same switch$3 same cycle	23	L1

END OF SEARCH HISTORY

h e b b cg b e e ch

Refine Search

Search Results -

Terms	Documents
L2 or L5	13

Database:
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Search: L6

Refine Search | Recall Text | Clear | Interrupt

Search History

DATE: Tuesday, October 12, 2004 Printable Copy Create Case

Set Name side by side	Query	Hit Count	Set Name result set
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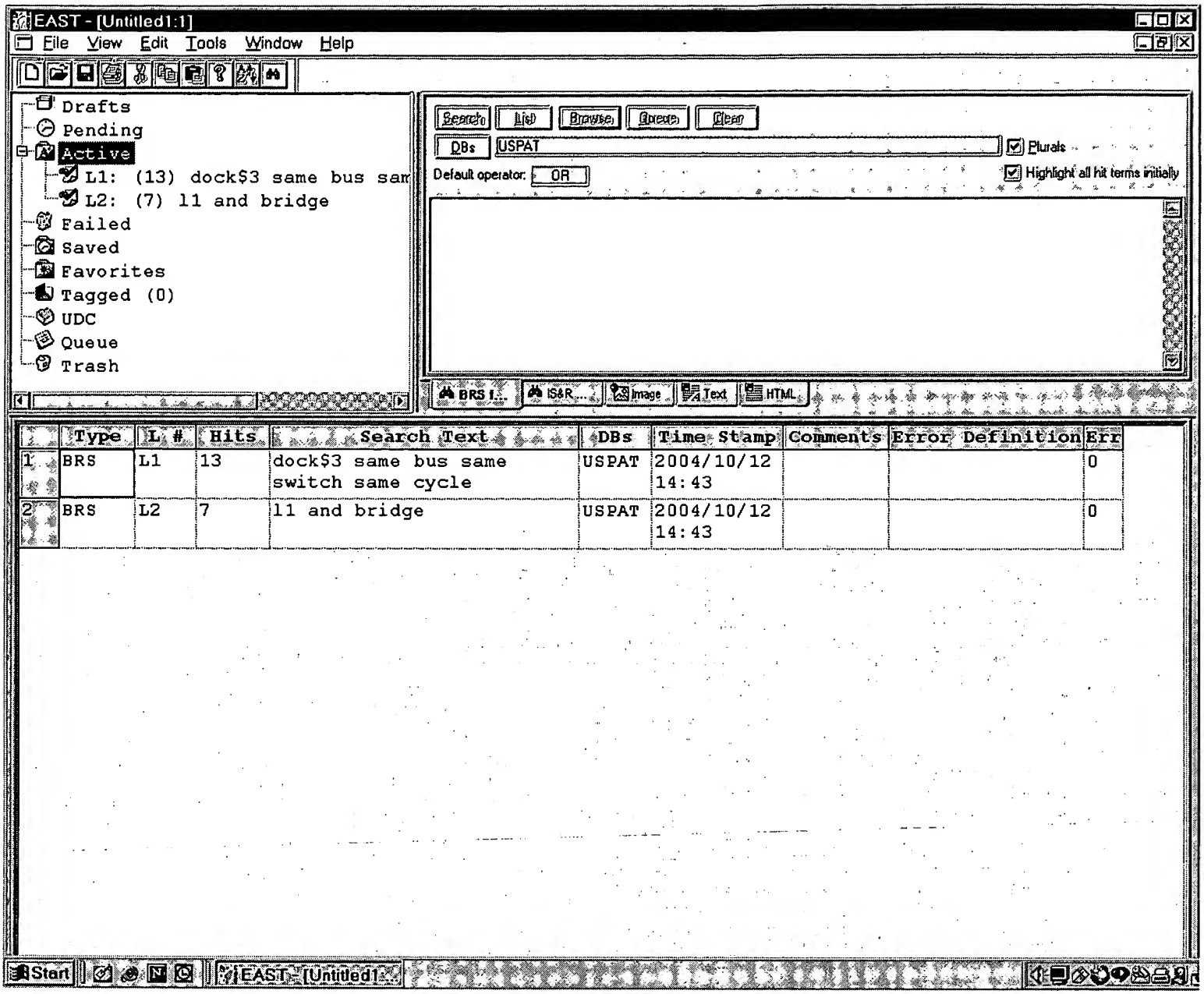
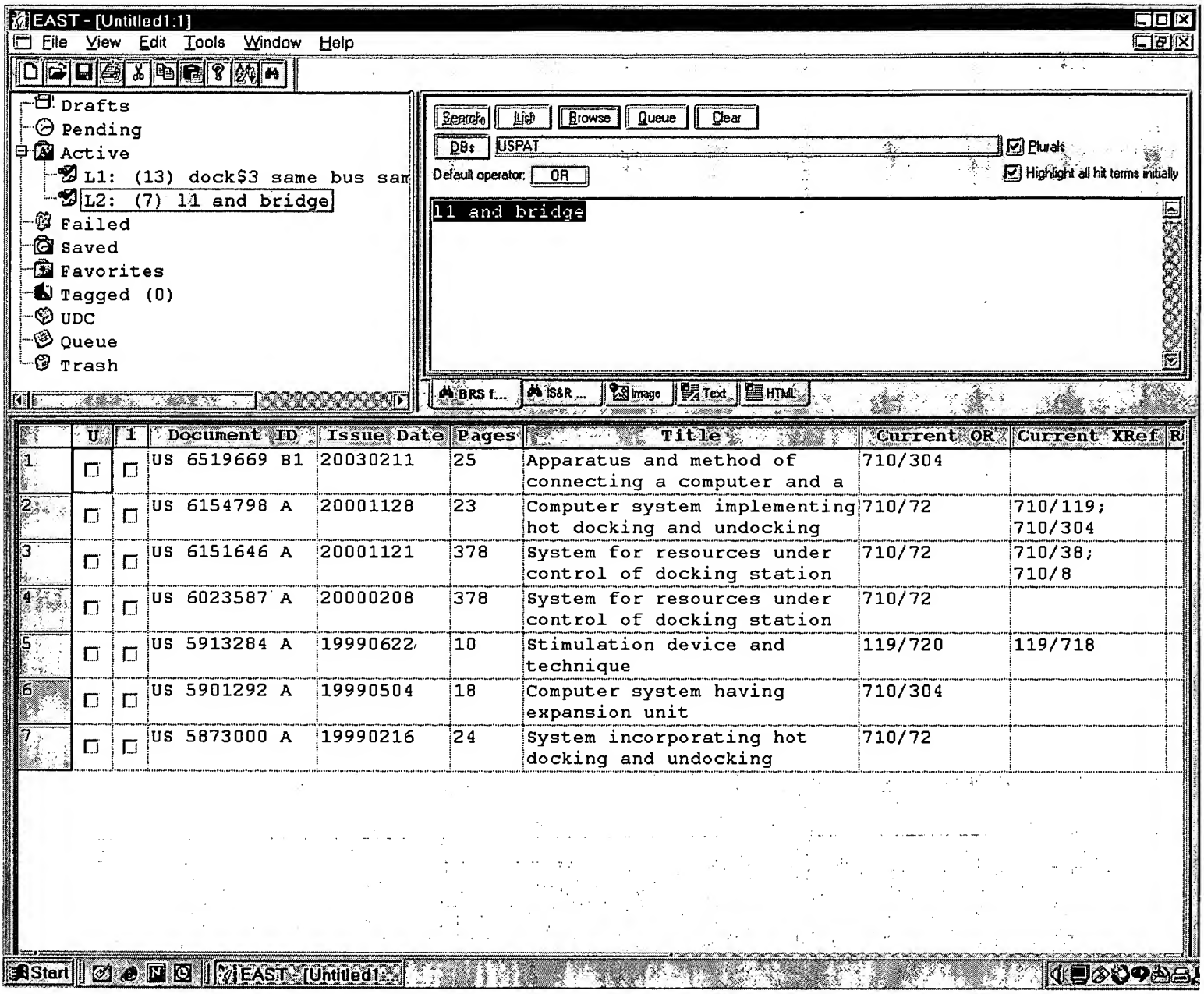
L5	l1 and L4	8	L5
L4	710/301,62,104,316,304,302,300,303,305;361/683,686;709/250,253.ccls.	8553	L4
DB=EPAB,JPAB,DWPI,TDBD; PLUR=YES; OP=OR			
L3	L2	0	L3
DB=PGPB,USPT,USOC; PLUR=YES; OP=OR			
L2	L1 and bridge	11	L2
L1	dock$3 same bus same switch$3 same cycle	23	L1

END OF SEARCH HISTORY

h e b b cg b e e ch



	Type	L #	Hits	Search Text	DBs	Time Stamp	Comments	Error Definition	Err
1	BRS	L1	13	dock$3 same bus same switch same cycle	USPAT	2004/10/12 14:43			0
2	BRS	L2	7	l1 and bridge	USPAT	2004/10/12 14:43			0



	U	1	Document ID	Issue Date	Pages	Title	Current OR	Current XRef	R
1	☐	☐	US 6519669 B1	20030211	25	Apparatus and method of connecting a computer and a	710/304		
2	☐	☐	US 6154798 A	20001128	23	Computer system implementing hot docking and undocking	710/72	710/119; 710/304	
3	☐	☐	US 6151646 A	20001121	378	System for resources under control of docking station	710/72	710/38; 710/8	
4	☐	☐	US 6023587 A	20000208	378	System for resources under control of docking station	710/72		
5	☐	☐	US 5913284 A	19990622	10	Stimulation device and technique	119/720	119/718	
6	☐	☐	US 5901292 A	19990504	18	Computer system having expansion unit	710/304		
7	☐	☐	US 5873000 A	19990216	24	System incorporating hot docking and undocking	710/72		

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dock* and bus Search

☐ Check to search within this result set

Results Key:
JNL = Journal or Magazine **CNF** = Conference **STD** = Standard

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1 **Fuzzy control for the future automatic guidance near the bus statior**
Debay, P.; Eude, V.; Hayat, S.; Edel, M.;
Fuzzy Systems, 1996., Proceedings of the Fifth IEEE International Conference on , Volume: 1 , 8-11 Sept. 1996
Pages:660 - 666 vol.1

[Abstract] [PDF Full-Text (836 KB)] IEEE CNF

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2 **PID, adaptive and fuzzy controls for the immaterial lateral guidance bus in boarding phase**
Debay, P.; Hayat, S.; Edel, M.;
Systems, Man, and Cybernetics, 1996., IEEE International Conference on , Vo 1 , 14-17 Oct. 1996
Pages:53 - 58 vol.1

[Abstract] [PDF Full-Text (500 KB)] IEEE CNF

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3 **Health monitoring on ground-based transit systems**
Hayward, C.R.; Bachoo, A.B.K.;
Public Transport Electronic Systems, 1996., International Conference on (Cont Publ. No. 425) , 21-22 May 1996
Pages:35 - 39

[Abstract] [PDF Full-Text (484 KB)] IEE CNF

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4 **Wireless video coding system demonstration**
Villasenor, J.; Jain, R.; Belzer, B.; Boring, W.; Chien, C.; Jones, C.; Liao, J.; Molloy, S.; Nazareth, S.; Schoner, B.; Short, J.;
Data Compression Conference, 1995. DCC '95. Proceedings , 28-30 March 19
Pages:448

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[Abstract] [PDF Full-Text (116 KB)] **IEEE CNF**

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Wireless video coding system demonstration

Villasenor, J. Jain, R. Belzer, B. Boring, W. Chien, C. Jones, C. Liao, J. Molloy, Nazareth, S. Schoner, B. Short, J.
Dept. of Electr. Eng., California Univ., Los Angeles, CA, USA;
This paper appears in: **Data Compression Conference, 1995. DCC '95. Pr**

Meeting Date: 03/28/1995 - 03/30/1995
Publication Date: 28-30 March 1995
Location: Snowbird, UT USA
On page(s): 448
Reference Cited: 0
Inspec Accession Number: 5086214

Abstract:
Summary form only given. We have developed and present here a prototype point wireless video system that has been implemented using a combination c commercial components and custom hardware. The coding algorithm being us of subband decomposition using low-complexity, integer-coefficient filters, sca quantization, and run-length and entropy coding. The prototype system consi following major components: spread spectrum radio with interface card and d compression board, and an NEC laptop and **docking** station which provide th slots and control. The compression algorithms are implemented on a board w 10000-gate FPGA. Prior to implementing the algorithms in hardware, a study performed to resolve issues of word length and scaling, and to select quantiza run length parameters. It was determined that 16-bit precision in the wavelet stage is sufficient to prevent under-low and overflow provided that rescaling c correctly performed. After processing by the FPGA, the compressed video is t to the PC for transmission over the radio. A commercial serial card (PI Card) synchronous serial interface to the radio. The serial controller chip used by th supports several serial protocols and thus the effect of the these protocols on a wireless environment can be tested

Index Terms:
16 bit FPGA NEC laptop PC **bus** control PC **bus** slots coding algorithm compres digital filters **docking** station driver entropy codes entropy coding integer-coefficie interface card laptop computers microcomputer applications point-to-point wireless v quantisation (signal) run-length coding runlength codes scalar quantization scaling

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controller chip spread spectrum communication spread spectrum radio subband dec
synchronous serial interface system demonstration telecommunication computing
telecommunication control video coding wireless video coding word length 16 bit
laptop PC **bus** control PC **bus** slots coding algorithm compression board digital fil
docking station driver entropy codes entropy coding integer-coefficient filters inte
laptop computers microcomputer applications point-to-point wireless video system qu
(signal) run-length coding runlength codes scalar quantization scaling serial contr
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L6: Entry 1 of 13 File: PGPB Feb 19, 2004

DOCUMENT-IDENTIFIER: US 20040034730 A1
TITLE: System and device for hot docking and undocking

Abstract Paragraph:
A system and device for performing hot docking and undocking operations in a docking station without the use of a PCI bridge. A combination of CMOS logic circuits functions to generate new PCI signals BUS_IDLE, PCI_EN_REQ, and PCI_SW_EN# which operate during docking and docking functions according to a timing specification. PCI _EN_REQ is a new trigger signal to initiate hot docking or undocking operations, BUS_IDLE indicates the state of the PCI bus (on a portable computer) when no devices are accessing the bus, PCI_SW_EN# functions to open the PCI bus to connect the portable computers PCI bus to the dock PCI bus. A process for using the circuits to accomplish docking and undocking functions is also disclosed.

Current US Classification, US Primary Class/Subclass:
710/304

Summary of Invention Paragraph:
[0002] This invention relates generally to a system for hot insertion and removal of portable devices from a docking station or bay. More specifically this invention provides a system and device for hot swapping of peripheral devices in a PCI based system, and particularly to replacing the PCI Bridge in traditional docking station systems, which is capable of detecting the PCI bus state of the portable device, sending signals from the portable device to request docking or undocking procedures, and appropriately isolating the PCI bus on the portable device from the PCI bus on the dock during hot docking and undocking procedures.

Summary of Invention Paragraph:
[0004] In the field of portable computing, the use of docking stations or docking bays as a means to extend the functionality and ease of use in portable computers is well known. Early docking systems required users to completely power down a portable computer before engaging docking or undocking operations with the docking station. More recently however, "hot docking" or "hot swappable" systems have overcome many of the disadvantages associated with these early docking systems. Today, conventional so called "hot docking" systems, which allow for a portable device which is powered on (or "hot") to be connected or disconnected from a docking station, typically involve the use of a PCI bridge to accomplish connection and control functions between the PCI bus of the portable computer and PCI devices on the dock.

Summary of Invention Paragraph:
[0005] Because of the speed at which PCI busses operate, typically no more than 4 PCI devices may be operated by a single bus. PCI bridge mechanisms were developed to enable larger numbers of PCI devices to be controlled by electrically isolating two PCI busses while allowing bus transfers to be forwarded from one bus to another. This is accomplished via primary and secondary PCI busses on the PCI bridge itself in conjunction with precise timing specifications and control software. Given the unique challenge presented in connecting a running system to PCI devices on a docking station, the PCI bridge architecture was adopted as a

means to accomplish hardware handshaking without compromising electrical components in either the computer or dock. Signal pins or proximity detection mechanisms have additionally been used to trigger or initiate the docking or undocking sequences in the PCI bridge system such that additional protection during insertion or removal from the dock is achieved. Once physically connected, all address, data and controlling signals of the portable device pass through the PCI Bridge (either on the portable device or docking station) such that PCI devices in the docking station may be controlled by the portable device.

Summary of Invention Paragraph:
[0006] These PCI bridge based docking systems, while addressing the problems inherent in early docking systems, add significant cost to the system during manufacture as the chips themselves are relatively expensive, and provide unnecessary and unused functionality for hot docking & undocking operations. Additionally, due to the complexity of PCI Bridge chips (PCI chips are generally highly refined ASIC chips which require significant software drivers to control functionality) and associated software controls, they take a great deal of time in connecting the portable device and docking station during docking and undocking operations. In the increasingly price driven market for portable computers, solutions for reducing cost in the components and manufacturing processes of these devices are highly sought after. Additionally, a simplified hot docking solution which allows users to connect and disconnect portable computing devices from a docking station quickly, such that minimal time is spent waiting for hardware handshaking to occur, would be highly beneficial. Therefore, it would be desirable to create a new low cost simplified hot docking system which is able to connect and disconnect a running portable device to a docking station more quickly than current PCI bridge based systems.

Detail Description Paragraph:
[0029] One goal of this present invention is to provide a low cost hot docking system that is able to quickly connect the PCI bus of a portable computer to the PCI devices in a docking station. The hot docking system of the current invention provides a low cost system for use in docking stations and portable computers which enables quick and reliable connection of the portable computers PCI bus to PCI devices in the docking station by using relatively simple and inexpensive CMOS logic gate circuits and new docking and undocking timing sequences. In so doing, expensive PCI Bridge chips are not required to enable hot docking functions of the system.

Detail Description Paragraph:
[0030] FIG. 1 illustrates the architecture of the current system, wherein a collection of logic circuits 10 of the current invention are placed on the docking station 4 to accomplish the docking and undocking functions traditionally performed by PCI bridge chips. Portable computer 2 is shown physically docked with docking station 4 via dock connect 12. A main object of the current invention is to control PCI devices in the PCI slots 14 using the PCI chipset 6 on the portable computer 2. The circuits 10 in conjunction with bus 8 allow for electrical isolation of portable computer and dock during docking and undocking, as well as providing hardware handshaking functions to enable operation of the PCI devices on the dock.

Detail Description Paragraph:
[0046] Because no PCI bridge is employed in the current invention to generate a clock signal, a clock buffer (can be from the main PCI clock) which is able to tune the clock skew from input to output is necessary to adjust system timing appropriately. Additionally, to further finely adjust system timing for smooth and error free operation, appropriate trace lengths should be designed on the printed wiring boards embodying components of the docking station, including the circuits of the current invention. Both adjustments to clock skew tunability and routing trace lengths are subjects of design consideration which are well known and commonly practiced in the field of circuit design. Those skilled in the art will

appreciate the nature of such considerations and be able to design elements appropriately in light of product requirements, manufacturing tolerances, and cost concerns.

Detail Description Paragraph:
[0050] It will be helpful in explaining the operation of circuits in the present invention to examine the process flow governing both docking and undocking operations. Looking now to FIG. 2, initial state 30 is shown as a system state during normal operation of the portable device. In this state no docking or undocking operations are in progress. In state 31, the microprocessor of the docking station is waiting for docking or undocking operations to occur. Once a docking operation begins (ie. The portable computer is placed in the docking station) the BIOS of the portable computer generates a docking operation command 32 to the microprocessor of the docking station. Once received, the dock microprocessor triggers the docking sequence 34 by setting PCI_EN_REQ=1 and REQ#=0. The system cycles an additional clock cycle if PCI_EN_REQ=0 until PCI_EN_REQ=1. The logic circuits of the current invention then check the PCI bus idle status 36 until BUS_IDLE=1. If BUS_IDLE=0 the system must cycle another time. Once the bus is idle, the bus switch on the portable computer is opened 38 by using BUS_IDLE=1 signal to preset the REQ#=1 which enables PCI_SW_EN#=0. When both REQ#=1 and PCI_SW_EN#=0 the PCI bus is connected and the operating system on the portable computer may rescan the PCI devices 40. At this time PCI devices on the dock may be controlled by the PCI bus of the portable computer, and at state 31, the dock microprocessor returns to waiting for undocking operation from the portable computer. When an undock operation occurs (ie. the portable computer begins to be removed from the dock) the portable computers BIOS will generate an undocking command 42 to the microprocessor of the dock. Upon receiving the undocking command, the dock microprocessor triggers the undocking sequence 44 by setting PCI_EN_REQ=0 and REQ#=0. The system cycles if PCI_EN_REQ=1 until PCI_EN_REQ=0 is set. The bus idle status is then checked 46 by system logic circuits until BUS_IDLE=1. If BUS_IDLE=0 the system must cycle until BUS_IDLE=1. The bus switch on the portable computer is then closed 48 using BUS_IDLE=1 to preset REQ#=1 which enables PCI_SW_EN#=1. When both REQ#=1 and PCI_SW_EN#=1 the PCI bus on the portable device is disconnected and the operating system rescans the PCI devices 50. At state 31 once again the dock microprocessor is waiting for docking operation from the portable computer.

Detail Description Paragraph:
[0051] Looking now to FIGS. 3 and 4, the timing of the system (corresponding to the process flow shown in FIG. 2) in relation to the system clock for both docking and undocking is shown. FIG. 3 illustrates the timing specification for docking operations. At time 60, PCI_EN_REQ is triggered high indicating a system request to connect with the dock. The REQ# is triggered low at time 62 to trigger system circuits to generate a bus request according to the PCI specification. When the bus is detected as idle by the system circuits, BUS_IDLE is set high at time 64 indicating that the bus switch may be opened. Before the bus is opened however, the bus request signal is disabled by setting REQ# high once again at time 66. This prohibits the PCI bus on the portable device from granting bus requests during the dock operation. PCI_SW_EN# is triggered low at time 67 and the PCI bus of the portable computer is opened to connect to the PCI bus of the dock. Time 68 indicates the passage of clock cycles (approximately 16 cycles in the preferred embodiment), after which BUS_IDLE# is triggered low granting ownership of the PCI bus to the system arbiter.

Detail Description Paragraph:
[0052] FIG. 4 illustrates the timing specification for undocking operations. At time 70, PCI_EN_REQ is triggered low indicating a system request to disconnect with the dock. The REQ# is also triggered low at time 72 to trigger system circuits to generate a bus request according to the PCI specification. Once again, when the bus is detected as idle by the system circuits, BUS_IDLE is set high at time 74 indicating that the bus switch may be closed. Before the bus is closed however, the

bus request signal is once again disabled by setting REQ# high at time 76. This prohibits the PCI bus on the portable device from granting bus requests during the undock operation. PCI_SW_EN# is triggered high at time 77 and the PCI bus of the portable computer is closed to disconnect the PCI bus of the dock. Time 78 indicated the passage of clock cycles (approximately 16 cycles in the preferred embodiment), after which BUS_IDLE# is again triggered low indicating ownership of the PCI bus to the system arbiter.

CLAIMS:

1. A system for hot-coupling and hot-decoupling of a PCI device in a first device and a PCI bus in a second device without powering down system power in the second device, wherein at least one of the first and second devices includes a PCI bridge, said system comprising: a logic circuit provided in at least one of the first and second devices, said logic circuit generating a first signal for controlling hot-coupling of the PCI device and the second signal for controlling hot-decoupling of the PCI device and the PCI bus independent of control of the PCI bridge; and control means for controlling coupling and decoupling of the PCI device and the PCI bus based on the first and second signals independent of the PCI bridge.

10. A method for hot-coupling and hot-decoupling of a PCI device in a first device and a PCI bus in a second device without powering down system power in the second device, wherein at least one of the first and second devices includes a PCI bridge, said method comprising: providing a logic circuit in at least one of the first and second devices, said logic circuit configured to generate a first signal for controlling hot-coupling of the PCI device and the PCI bus independent of control of the PCI bridge, and to generate a second signal for controlling hot-decoupling of the PCI device and the PCI bus independent of control of the PCI bridge; and controlling the coupling and decoupling of the first and second devices based on the first and second signals independent of the PCI bridge.

11. A docking device for hot docking and undocking a portable device that includes a PCI bus and a PCI bridge without powering down system power in said portable device, said docking device comprising: a logic circuit generating a first signal for controlling hot-docking of the portable device in which the PCI device is coupled to the PCI bus independent of control of the PCI bridge, and generating a second signal for controlling hot-undocking of the portable device in which the PCI device is decoupled from the PCI bus independent of control of the PCI bridge; and control means for controlling the coupling and decoupling of the PCI device and the PCI bus based on the first and second signals independent of the PCI bridge.

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L6: Entry 1 of 13 File: PGPB Feb 19, 2004

PGPUB-DOCUMENT-NUMBER: 20040034730
PGPUB-FILING-TYPE: new
DOCUMENT-IDENTIFIER: US 20040034730 A1

TITLE: System and device for hot docking and undocking

PUBLICATION-DATE: February 19, 2004

INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
Yu, Te-Hua	Jung-Ii City		TW	

APPL-NO: 10/ 222174 [PALM]
DATE FILED: August 16, 2002

INT-CL: [07] G06 F 13/00

US-CL-PUBLISHED: 710/304
US-CL-CURRENT: 710/304

REPRESENTATIVE-FIGURES: 1

ABSTRACT:

A system and device for performing hot docking and undocking operations in a docking station without the use of a PCI bridge. A combination of CMOS logic circuits functions to generate new PCI signals BUS_IDLE, PCI_EN_REQ, and PCI_SW_EN# which operate during docking and docking functions according to a timing specification. PCI _EN_REQ is a new trigger signal to initiate hot docking or undocking operations, BUS_IDLE indicates the state of the PCI bus (on a portable computer) when no devices are accessing the bus, PCI_SW_EN# functions to open the PCI bus to connect the portable computers PCI bus to the dock PCI bus. A process for using the circuits to accomplish docking and undocking functions is also disclosed.

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PGPUB-DOCUMENT-NUMBER: 20030154338
PGPUB-FILING-TYPE: new
DOCUMENT-IDENTIFIER: US 20030154338 A1

TITLE: Switched hot docking interface

PUBLICATION-DATE: August 14, 2003

INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
Boz, Richard H.	Huntington Station	NY	US	
Streiber, Ronald W.	Smithtown	NY	US	
Virzi, John D.	Bayside	NY	US	
Wahler, Richard E.	St. James	NY	US	

APPL-NO: 10/ 076105 [PALM]
DATE FILED: February 14, 2002

INT-CL: [07] G06 F 13/00

US-CL-PUBLISHED: 710/303; 710/306
US-CL-CURRENT: 710/303; 710/306

REPRESENTATIVE-FIGURES: 2

ABSTRACT:

A method and apparatus for hot-docking is disclosed. In one embodiment, a portable computer system includes a bus bridge and a bus coupled to the bus bridge. The bus may have one or more peripheral devices or peripheral interfaces coupled to it. The bus may also be coupled to a docking interface having a bus switch. The bus switch, when closed and the computer is coupled to a docking station, may couple the bus to a peripheral interface in a docking station. The bus switch may close responsive to docking, thereby completing the electrical coupling of the bus to the peripheral interface in the docking station. The closing of the bus switch may be controlled by the docking interface such that operations on the bus are not interrupted during the docking procedure.

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(12) **United States Patent**
Yanagisawa

(10) Patent No.: US 6,519,669 B1
(45) Date of Patent: Feb. 11, 2003

(54) **APPARATUS AND METHOD OF CONNECTING A COMPUTER AND A PERIPHERAL DEVICE**

(75) Inventor: **Takashi Yanagisawa**, Yokohama (JP)

(73) Assignee: International Business Machines Corporation, Armonk, NY (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: 09/419,375

(22) Filed: Oct. 15, 1999

(30) **Foreign Application Priority Data**

Oct. 16, 1998 (JP) 10-295105

(51) Int. Cl.[7] G06F 13/00

(52) U.S. Cl. 710/304

(58) Field of Search 710/301–304; 713/300, 302

(56) **References Cited**

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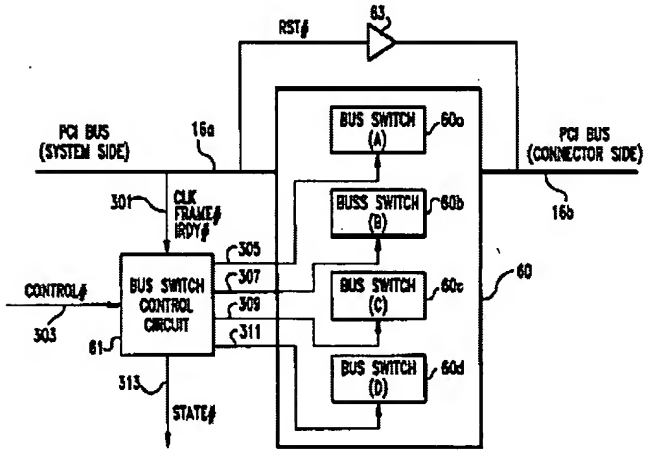
(57) **ABSTRACT**

The invention provides an apparatus and a method of hot docking/undocking a bus line and a peripheral device of a computer. The bus switch 60 connects and disconnects the bus lines 16a and 16b. The bus switch control circuit 61 generates no line 305–311 a bus switch control signal which responds to a turn around cycle from the signal on the bus line 16a and supplies it to the bus switch. The bus switch is operated to open/close in response to the bus switch control signal. Then, the bus line 16a is in a turn around cycle in connecting/disconnecting the bus lines 16a and 16b so that the cycle operation of the bus is not affected by a noise accompanying opening/closure.

28 Claims, 14 Drawing Sheets



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United States Patent [19]

Lin et al.

[11] Patent Number: 5,873,000

[45] Date of Patent: Feb. 16, 1999

[54] SYSTEM INCORPORATING HOT DOCKING AND UNDOCKING CAPABILITIES WITHOUT REQUIRING A STANDBY OR SUSPEND MODE BY PLACING LOCAL ARBITERS OF SYSTEM AND BASE INTO IDLE STATE

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[73] Assignee: Compaq Computer Corporation, Houston, Tex.

[21] Appl. No.: 684,255

[22] Filed: Jul. 19, 1996

[51] Int. Cl.[6] G06F 13/00

[52] U.S. Cl. 395/892; 395/882

[58] Field of Search 361/686; 395/882, 395/281, 299, 283, 892

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Assistant Examiner—David Tan
Attorney, Agent, or Firm—Pravel, Hewitt & Kimball

[57] ABSTRACT

A method for hot docking and hot undocking a portable computer and a docking station. The portable computer and docking station are physically coupled via a shared PCI bus and an expansion connector. Varying length pins in the expansion connector generate docking and undocking handshaking signals used by microcontrollers in the portable computer and docking station. The portable computer and docking station are functionally connected via low on-resistance switches located in the portable computer. Following a docking event, closure of the switches connects the portion of the shared PCI bus in the docking station with the PCI bus in the portable computer. When the switches are open, the PCI busses are functionally isolated. Both the portable computer and the docking station also include a local arbiter for arbitrating and granting bus control requests from devices coupled to the shared PCI bus. These local arbiters may be placed into an idled state by either the operating system (through system BIOS) or by the microcontrollers. The arbiters are idled during docking and undocking events in order to inhibit bus cycles on the PCI bus, thereby preventing cycles from being lost. Following completion of a hot docking or undocking event, Plug-and-Play system reconfiguration is carried out so that all system resources may be recognized and properly utilized by the operating system.

28 Claims, 11 Drawing Sheets